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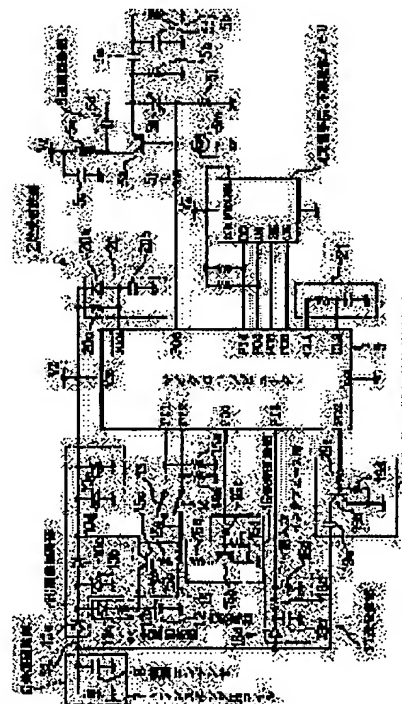
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KOKUBU SADAOK**(54) TRANSMITTING/RECEIVING EQUIPMENT AND LOAD CONTROL SYSTEM FOR VEHICLE UTILIZING THE SAME****(57)Abstract:**

PROBLEM TO BE SOLVED: To reduce the wast of circuit components, to reduce costs, to prevent extension and to simultaneously improve the degree of freedom for design and workability for production.

SOLUTION: A microcomputer 3 at transmitting/receiving equipment 2 is switched to active state corresponding to the output of a power supply part 10 for rectifying a carrier wave signal in the state of receiving that carrier wave signal from a transmission/reception ECU on the vehicle side to a resonance circuit part 6 and when a lock switch 13 or an unlock switch 14 is turned on, corresponding to the output of a secondary battery 12, the microcomputer is switched into active state through a switching circuit 15. When an operating signal corresponding to the operation of the unlock switch 14 is received, the microcomputer switched into active state performs control for transmitting a remote signal through a transmission circuit part 5 and when an inquiry signal is received through the resonance circuit part 6, control is performed for transmitting a response signal containing an identification code in an EEPROM 4 through an output interface part 19 and the resonance circuit part 6.

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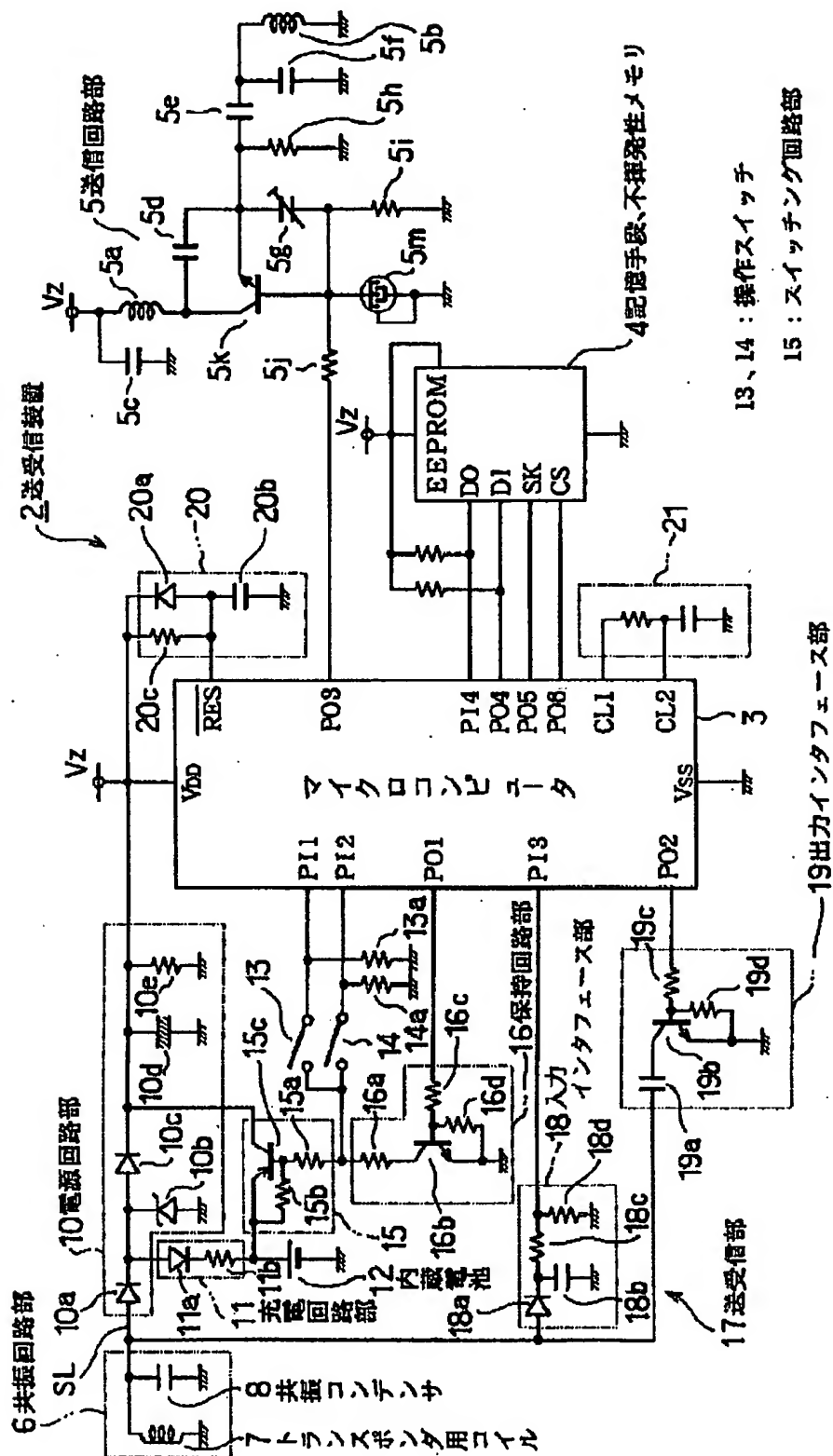
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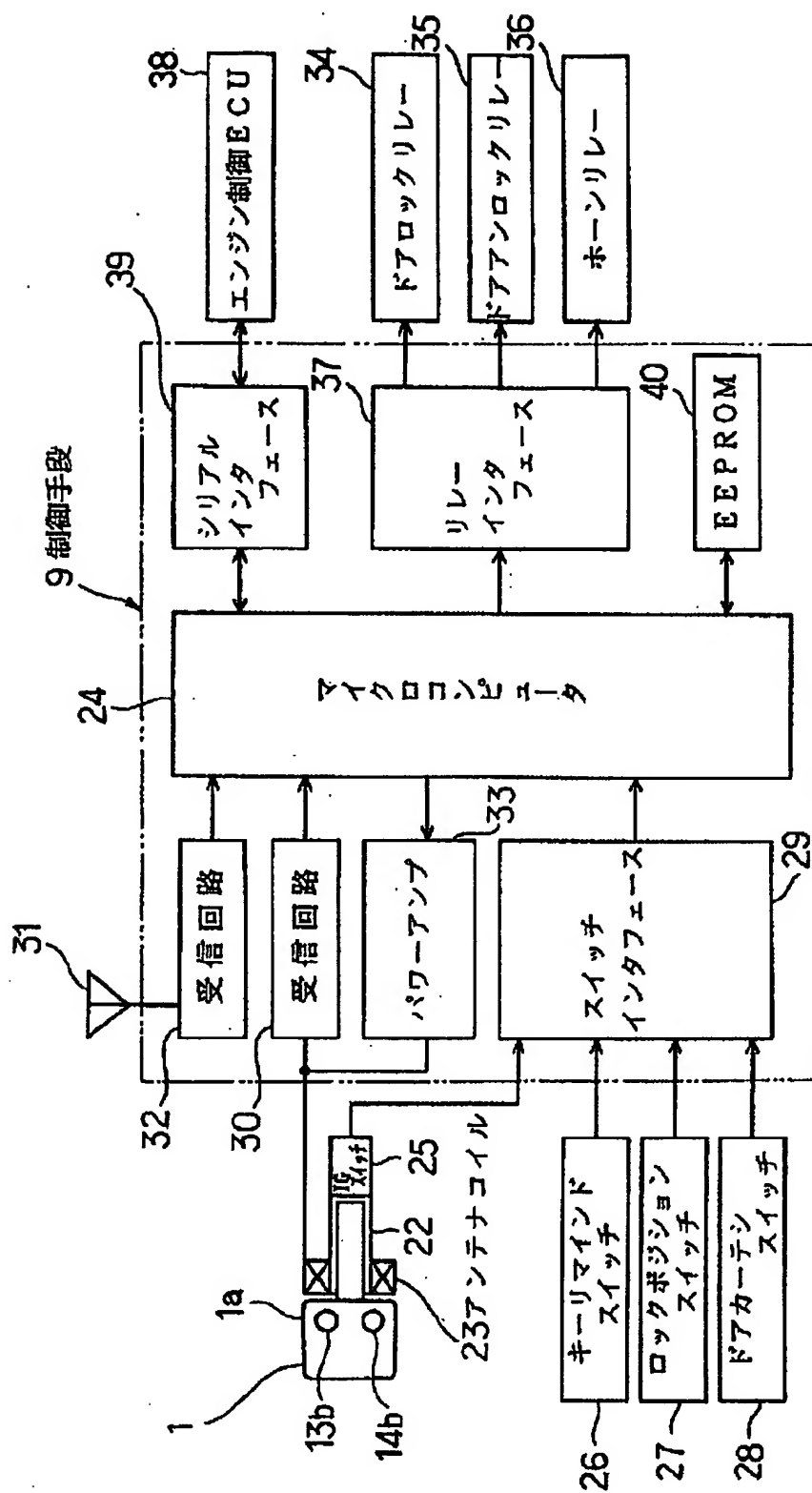
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DRAWINGS

[Drawing 1]



[Drawing 2]



[Drawing 3]



[JP,09-135481,A]

CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE
INVENTION TECHNICAL PROBLEM MEANS DESCRIPTION OF DRAWINGS DRAWINGS

[Translation done.]

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CLAIMS

[Claim(s)]

[Claim 1] Where the electromagnetic coupling of the transceiver section containing the resonance circuit section which consists of the coil for transponders and a resonant capacitor, and this transceiver section is carried out to external antenna coil The power circuit section which rectifies the power signal given through the transceiver section concerned from the antenna coil, The microcomputer which operates with the output of this power circuit section, or the output of a built-in cell, The actuation switch which generates an actuation signal and is given to said microcomputer when external actuation is carried out, The output of said built-in cell is used for the remote signal for operating a load by remote control. The sending-circuit section which can transmit, The input interface section which discriminates from the question signal given with said power signal to said transceiver section, and is given to said microcomputer, It has the storage means which memorizes the identification code of a proper and changes, and the output interface section for transmitting the reply signal which answers said question signal and contains said identification code through said transceiver section. When control which transmits said remote signal through said sending-circuit section when said actuation signal is received is performed and said question signal is received, said microcomputer The transmitter-receiver characterized by being constituted so that control which transmits the reply signal which contains the identification code concerned while reading identification code from said storage means through said output interface section and the transceiver section may be performed.

[Claim 2] Said microcomputer is a transmitter-receiver according to claim 1 characterized by being constituted so that control which transmits the remote signal containing the code code memorized by said storage means through said sending-circuit section may be performed, when said actuation signal is received.

[Claim 3] Said storage means is a transmitter-receiver according to claim 1 or 2 characterized by considering as the configuration which can change said identification code or a code code by using the nonvolatile memory in which data rewriting is possible.

[Claim 4] The switching circuit section which operates according to external actuation of said actuation switch being carried out, and gives the output of said built-in cell to said sending-circuit section and microcomputer, It has the holding circuit section which holds this switching circuit section to operating state. Said microcomputer When the actuation signal according to external actuation of said actuation switch is received, a period until transmission of the remote signal which led completes said sending-circuit section at least A transmitter-receiver given in any of claims 1-3 characterized by being constituted so that said switching circuit section may be held to operating state through said holding circuit section they are.

[Claim 5] After a rechargeable battery constitutes said built-in cell, said power circuit section is a transmitter-receiver given in any of claims 1-4 characterized by considering as the configuration equipped with the charge circuit section which charges the above-mentioned rechargeable battery using the power signal given through the transceiver section from said antenna coil they are.

[Claim 6] It is the transmitter-receiver according to claim 5 characterized by functioning as having the

electrical-potential-difference detecting circuit section which detects the terminal voltage of said rechargeable battery, boiling said microcomputer when the detection electrical potential difference by said electrical-potential-difference detecting circuit section exceeds the upper limit electrical potential difference set up beforehand, and stopping the charge actuation by said charge circuit section.

[Claim 7] It is the control system of the load for cars using a transmitter-receiver given in any of claims 1-5 they are. The antenna coil by which an electromagnetic coupling is carried out to the coil for transponders which the transmitter-receiver concerned has where said transmitter-receiver is set to a convention location at a car side, Where the electromagnetic coupling of the above-mentioned coil for transponders is carried out to this antenna coil, while transmitting a power signal and a question signal through the antenna coil concerned to said transmitter-receiver The load control system for cars characterized by establishing the control means to which the immobilizer ability which permits starting of the engine for cars only when the identification code in the reply signal received through said antenna coil after this transmission is in agreement with the identification code set up beforehand was set.

[Claim 8] The antenna coil by which an electromagnetic coupling is carried out to the coil for transponders which is the control system of the load for cars using a transmitter-receiver according to claim 6, and the transmitter-receiver concerned has after said transmitter-receiver has been set to a car side by the convention location, Where the electromagnetic coupling of the above-mentioned coil for transponders is carried out to this antenna coil, while transmitting a power signal and a question signal through the antenna coil concerned to said transmitter-receiver The control means to which the immobilizer ability which permits starting of the engine for cars only when the identification code in the reply signal received through said antenna coil after this transmission is in agreement with the identification code set up beforehand was set is established. Said control means is a load control system for cars characterized by being constituted in after starting authorization of said engine for cars so that transmission of said power signal over said transmitter-receiver may be continued.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the transmitter-receiver equipped with the transmitter ability for transmitting the remote signal for operating a load by remote control, and the transponder ability of answering a letter in a reply signal when a power signal and a question signal are given, and the load control system for cars using this transmitter-receiver.

[0002]

[Description of the Prior Art] For example, in the automobile, in order to aim at improvement in the security engine performance to a theft, adding the function as an electronic key in which electric identification code was used, to an ignition key is performed. In this case, it has become general to the key grip of an ignition key to build in a transceiver unit, and the above-mentioned transceiver unit has composition equipped with the transponder ability of answering a letter in the reply signal containing the identification code memorized beforehand, when a power signal and a question signal are given from the exterior.

[0003] For the above-mentioned electronic key function, furthermore, to an automatic car side Where the ignition key constituted as mentioned above is inserted in the key hole for engine starting Transmit said power signal and a question signal, and said reply signal is received from the transceiver unit by the side of the ignition key concerned. Only when the identification code in the reply signal is in agreement with the identification code set up beforehand, it considers as the configuration which forms the transmission and reception ECU equipped with the immobilizer ability of permitting engine starting by the ignition key.

[0004] in order that this may operate a door-lock device by remote control in an automobile independently, the transmitter equipped with the transmitter that the keyless entry system system of a wireless method has spread widely, and transmits the remote signal which contains the identification code beforehand decided according to actuation of a switch in this system with an air propagation signal (for example, electric wave) is formed, and, on the other hand, this transmitter is built in the unit case which constitutes a key holder -- usually -- ** -- it has become.

[0005]

[Problem(s) to be Solved by the Invention] Although the passive circuit elements which can be made to serve a double purpose were also under the situation many, with the transceiver unit equipped with transponder ability, and the transmitter equipped with transmitter ability, when both sides needed transponder ability and transmitter ability, while the futility of passive circuit elements increased and causing the jump of cost, with a configuration, there was a trouble of enlarging as a whole on the relation prepared after these transceiver unit and the transmitter have dissociated conventionally.

[0006] Moreover, since it was common to consist of hard logic as for the transponder ability of a transceiver unit, the communications protocol during the transmission and reception ECU by the side of a car will be fixed from the beginning, and it had the trouble to say that the degree of freedom on a design became low as a result. And since the scramble processing technique was uniquely decided when

applying a scramble to identification code in order to raise the security engine performance, when a different scramble for every manufacture manufacturer of an automobile or destination was applied, there was a trouble that the fabrication operation nature got worse -- there is the need of changing a hardware configuration.

[0007] This invention is made in view of the above-mentioned situation, and the purpose is in offering the control system of the load for cars using the transmitter-receiver which enabled it to solve each above trouble at once, and its transmitter-receiver by adopting the configuration of control by the same microcomputer realizing transponder ability and transmitter ability.

[0008]

[Means for Solving the Problem] In order that the transmitter-receiver by this invention may solve the above technical problems, it is in the condition that the electromagnetic coupling of the transceiver section containing the resonance circuit section which consists of the coil for transponders and a resonant capacitor, and this transceiver section was carried out to external antenna coil. The power circuit section which rectifies the power signal given through the transceiver section concerned from the antenna coil, The microcomputer which operates with the output of this power circuit section, or the output of a built-in cell, The actuation switch which generates an actuation signal and is given to said microcomputer when external actuation is carried out, The output of said built-in cell is used for the remote signal for operating a load by remote control. The sending-circuit section which can transmit, The input interface section which discriminates from the question signal given with said power signal to said transceiver section, and is given to said microcomputer, After having the storage means which memorizes the identification code of a proper and changes, and the output interface section for transmitting the reply signal which answers said question signal and contains said identification code through said transceiver section When control which transmits said remote signal through said sending-circuit section when said actuation signal is received for said microcomputer is performed and said question signal is received While reading identification code from said storage means, it considers as the configuration which performs control which transmits the reply signal containing the identification code concerned through said output interface section and the transceiver section.

[0009] According to this configuration, at least, while being able to constitute the whole transmitter-receiver as one unit, since a microcomputer can be made into the passive circuit elements used also [ability / transponder ability and / both / transmitter], the futility of passive circuit elements decreases and it comes be made into cost **. And since transponder ability is controllable by the program of a microcomputer, while a communications protocol can be changed freely and the degree of freedom on a design becomes high by it, the scramble of the specification of the number of ** can be set up easily, without changing a hardware configuration, and it may come (claim 1) to raise fabrication operation nature.

[0010] In this case, it can consider now as the passive circuit elements which were good also as a configuration which performs control which transmits the remote signal containing the code code memorized by said storage means in said microcomputer when said actuation signal is received through said sending-circuit section, and used the above-mentioned storage means other than a microcomputer also [ability / transponder ability and / both / transmitter] in this case (claim 2).

[0011] Moreover, you may constitute possible [modification of said identification code] by using the nonvolatile memory in which data rewriting is possible for said storage means, and while according to this configuration being able to make now a setup and modification of identification code easily and raising the degree of freedom on a design further, that storage means can be used now to other useful data storages, and it becomes convenient on actual use (claim 3).

[0012] Furthermore, the switching circuit section which operates according to external actuation of said actuation switch being carried out, and gives the output of said built-in cell to said sending-circuit section and microcomputer, After having the holding circuit section which holds this switching circuit section to operating state When the said microcomputer actuation-signal according to external actuation of said actuation switch is received, a period until transmission of the remote signal which led completes said sending-circuit section at least It is good also as a configuration which holds said switching circuit

section to operating state through said holding circuit section.

[0013] When an actuation switch is operated according to this configuration, since the power source of the sending-circuit section for the microcomputer concerned and remote signal transmission comes to be held through the switching circuit section and the holding circuit section, the send action of a remote signal will be performed only by carrying out one-touch control of the actuation switch, and that operability of a period [until the send action of the remote signal by the microcomputer is completed] comes (claim 4) to improve.

[0014] Moreover, it can also consider as the configuration equipped with the charge circuit section which charges the above-mentioned rechargeable battery using the power signal to which said power circuit section is given through the transceiver section from said antenna coil after a rechargeable battery constitutes said built-in cell, and according to this configuration, since exchange of a built-in cell becomes unnecessary substantially, maintenance nature comes (claim 5) to improve.

[0015] In this case, after having the electrical-potential-difference detecting circuit section which detects the terminal voltage of said rechargeable battery, when the upper limit electrical potential difference to which the detection electrical potential difference by said electrical-potential-difference detecting circuit section was beforehand set in said microcomputer is exceeded, it can be alike, it can consider as the configuration which functions as stopping the charge actuation by said charge circuit section, and according to this configuration, the overcharge over a rechargeable battery can be beforehand prevented now (claim 6).

[0016] After considering as the configuration using the transmitter-receiver indicated by any of above-mentioned claims 1-5 they are, the control system of the load for cars by this invention The antenna coil by which an electromagnetic coupling is carried out to the coil for transponders which the transmitter-receiver concerned has where said transmitter-receiver is set to a convention location at a car side, Where the electromagnetic coupling of the above-mentioned coil for transponders is carried out to this antenna coil, while transmitting a power signal and a question signal through the antenna coil concerned to said transmitter-receiver Only when the identification code in the reply signal received through said antenna coil after this transmission is in agreement with the identification code set up beforehand, it considers as the configuration which establishes the control means to which the immobilizer ability which permits starting of the engine for cars was set (claim 7).

[0017] Moreover, it sets to the control system of the load for cars using said transmitter-receiver according to claim 6. The antenna coil by which an electromagnetic coupling is carried out to the coil for transponders which the transmitter-receiver concerned has where said transmitter-receiver is set to a convention location at a car side, Where the electromagnetic coupling of the above-mentioned coil for transponders is carried out to this antenna coil, while transmitting a power signal and a question signal through the antenna coil concerned to said transmitter-receiver Only when the identification code in the reply signal received through said antenna coil after this transmission is in agreement with the identification code set up beforehand, after establishing the control means to which the immobilizer ability which permits starting of the engine for cars was set In after starting authorization of said engine for cars, the rechargeable battery by the side of a transmitter-receiver can be charged by considering as the configuration which continues transmission of said power signal [as opposed to said transmitter-receiver for said control means] (claim 8).

[0018]

[Embodiment of the Invention] It explains referring to drawing 1 and drawing 2 hereafter about the 1st example which applied this invention to the load control system for automobiles. The electric configuration of the transmitter-receiver 2 built in where unitization is carried out to drawing 1 to the key grip of the ignition key (a sign 1 is attached and shown in drawing 2) equipped with the function as a remote key is shown.

[0019] The transponder ability for answering a letter in the reply signal containing the identification code which was constituted centering on the microcomputer 3, answered the question signal when a power signal and a question signal were received from the transmitter ability for transmitting the remote signal containing the code code set up beforehand and the exterior, and was set up beforehand is set up,

and the above-mentioned transmitter-receiver 2 explains the concrete configuration below.

[0020] That is, said code and identification code of a proper are memorized by the ignition key 1 at EEPROM4 (equivalent to the storage means and nonvolatile memory as used in the field of this invention) accessed with a microcomputer 3. In addition, the above-mentioned code and identification code may be the same codes. Moreover, the power source of EEPROM4 is given from a power supply terminal Vz.

[0021] The sending-circuit section 5 prepared so that electric power might be supplied from a power supply terminal Vz. It is for transmitting the remote signal (a lock signal and unlocking signal) for being controlled by the microcomputer 3 and ordering it the lock and unlocking of the door-lock device for automobiles as a load for cars (not shown). It is constituted as an oscillator circuit which connected Coila [5] and 5b, Capacitorc [5]-5f, and variable-capacity capacitor 5g, Resistance 5h-5j, transistor 5k, and 5m of SAW components like illustration. In addition, carrier frequency is set as a VHF band or a UHF band, and this sending-circuit section 5 is considered as the configuration which transmits the remote signal of the shape of a pulse train containing said code by amplitude modulation.

[0022] The resonance circuit section 6 carries out parallel connection of the coil 7 for transponders, and the resonant capacitor 8 between signal-line SL and a grand terminal, and is constituted between, and the resonance frequency is set up so that it may become equal to the frequency band of the carrier signal (equivalent to the power signal as used in the field of this invention) transmitted from the transmission and reception ECU as a control means established at the automatic car side (a sign 9 is attached and shown in drawing 2).

[0023] The power circuit section 10 connected to the above-mentioned signal-line SL is for giving the output which carried out rectification smooth [of the carrier signal which the resonance circuit section 6 received] to said power supply terminal Vz and the power supply terminal VDD of a microcomputer 3, and has the composition of having connected diode 10a for rectification, reference diode 10b, diode 10c [for reverse inhibition], and capacitor 10d for smooth, and resistance 10e like illustration.

[0024] The charge circuit section 11 was formed in order to charge the rechargeable battery 12 built in the transmitter-receiver 2, and it has the composition of having connected diode 11a and current-limiting-resistor 11b of an illustration polarity to the serial between the cathode of diode 10a for rectification in said power circuit section 10, and the plus side edge child of a rechargeable battery 12. In addition, the minus side edge child of a rechargeable battery 12 is connected to the grand terminal.

[0025] A lock switch 13 and the unlocking switch 14 (all are equivalent to the actuation switch as used in the field of this invention) are operated, respectively, when outputting the lock signal and unlocking signal which are a remote signal from said sending-circuit section 5, and these are constituted by the momentary switch of a normally open form.

[0026] In this case, if it is in a lock switch 13 and the unlocking switch 14, while common connection of one one end each is made, that common node is connected to the plus side edge child of a rechargeable battery 12 through the resistance 15a and 15b in the switching circuit section 15 mentioned later.

Moreover, each other end side of a lock switch 13 and the unlocking switch 14 is connected to the grand terminal through the pull down resistors 13a and 14a corresponding to each while connecting with the input port PI1 and PI2 of a microcomputer 3, respectively.

[0027] By this, an actuation signal will be inputted into the input port PI1 and PI2 of a microcomputer 3 whenever a lock switch 13 and the unlocking switch 14 are operated.

[0028] The above-mentioned switching circuit section 15 is for giving the output of a rechargeable battery 12 to a microcomputer 3, EEPROM4, and the sending-circuit section 5 through said power supply terminal Vz, and has the composition of having connected between the emitter collectors of pnp form transistor 15c between the plus side edge child of a rechargeable battery 12, and the cathode of diode 10c in said power circuit section 10. In addition, in the switching circuit section 15, said resistance 15a is connected between the common nodes of the base of transistor 15c, said lock switch 13, and the unlocking switch 14, and said resistance 15b is connected between the base emitters of transistor 15c.

[0029] As a result of considering as such a configuration, the switching circuit section 15 presents the operating state by which transistor 15c was turned on, when ON actuation of a lock switch 13 or the

unlocking switch 14 is carried out, and the output of a rechargeable battery 12 comes to be given to a microcomputer 3, EEPROM4, and the sending-circuit section 5 through a power supply terminal Vz according to this.

[0030] The holding circuit section 16 is formed in order to hold the operating state of the above-mentioned switching circuit section 15 according to the command from a microcomputer 3. This holding circuit section 16 between resistance 15a in said switching circuit section 15, and a grand terminal It has the composition of having connected the series circuit between the collector emitters of resistance 16a and npn form transistor 16b. Furthermore, while connecting the base of the transistor 16b through resistance 16c to the output port PO1 of a microcomputer 3, it has the composition of having connected 16d of resistance between the base emitters of the transistor 16b concerned.

[0031] Therefore, the above-mentioned holding circuit section 16 is in the condition that transistor 16b was turned on by the signal from the output port PO1 of a microcomputer 3, and comes to hold the ON state of transistor 15c in the switching circuit section 15, i.e., the operating state of the switching circuit section 15 concerned.

[0032] Now, the transceiver section 17 is constituted besides said resonance circuit section 6 including the input interface section 18 and the output interface section 19. In this case, the input interface section 18 which intervened between signal-line SL and input port PI3 of a microcomputer 3 is for discriminating from the question signal given with a carrier signal through the resonance circuit section 6, and giving above-mentioned input port PI3, and has composition connected like diode 18 for detection a, capacitor 18b, resistance 18c, and 18d illustration.

[0033] Moreover, the output interface section 19 which intervened between signal-line SL and the output port PO2 of a microcomputer 3 They are the resonant capacitor 8 of the resonance circuit section 6, and juxtaposition with the configuration of having connected the series circuit between the collector emitters of capacitor 19a for a modulation, and npn form transistor 19b. Furthermore, while connecting the base of the transistor 19b through resistance 19c to the output port PO2 of a microcomputer 3, it has the composition of having connected 19d of resistance between the base emitters of the transistor 19b concerned.

[0034] It has the composition that a period until it goes up more than predetermined level is a thing for the power-on-reset function to hold the microcomputer 3 concerned in the reset condition, and the voltage level (output voltage level of a power supply terminal VZ) with which a reset circuit 20 is given to the power supply terminal VDD of a microcomputer 3 connected like illustration of diode 20a, capacitor 20b, and resistance 20c. Moreover, CR circuit 21 is formed in order to determine the clock frequency of a microcomputer 3.

[0035] A deer is carried out and the function of the transmitter-receiver 2 constituted as mentioned above below is explained with the contents of control by the microcomputer 3. That is, when the carrier signal (power signal) and the question signal which are transmitted like the after-mentioned are received through the resonance circuit section 6 from a transmission-and-reception ECU 9 side, it comes to give the output whose power circuit section 10 carried out rectification smooth [of the carrier signal which received] to the power supply terminal VDD of a microcomputer 3 and the output voltage rises more than predetermined level, the reset maintenance condition by the reset circuit 20 is canceled, and the microcomputer 3 concerned is switched to an active state. Moreover, the input interface section 18 discriminates from the received question signal, and comes to give input port PI3 of a microcomputer 3.

[0036] Thus, the microcomputer 3 made into the active state comes to demonstrate the function as a transponder of transmitting the reply signal containing the identification code memorized by EEPROM4 through the resonance circuit section 6 (reply), by answering that a question signal is given through the input interface section 18, and operating the output interface section 19.

[0037] In this case, if it is in a microcomputer 3, the above-mentioned reply signal is answered to a transmission-and-reception ECU 9 side by carrying out amplitude modulation of the carrier signal which received in the mode according to the above-mentioned reply signal, and detecting the impedance change condition of resonance circuit section 6 part by such the output interface section 19 to a transmission-and-reception ECU 9 side by changing the impedance of resonance circuit section 6 part by

the on-off control of transistor 19b in the output interface section 19. In addition, to the reply signal transmitted as mentioned above, protection and scramble of arbitration can be applied based on the program of a microcomputer 3.

[0038] At this time, in transmission and reception ECU 9, it has the composition of transmitting only a carrier signal continuously after reception of the above-mentioned reply signal, and that carrier signal is given to the charge circuit section 11 through diode 10a for rectification in the resonance circuit section 6 and the power circuit section 10 so that it may mention later. By this, a rechargeable battery 12 will be charged through the charge circuit section 11 in the period when the resonance circuit section 6 has received the above-mentioned carrier signal.

[0039] Moreover, in the condition of having not received the carrier signal and question signal from a transmission-and-reception ECU 9 side, when ON actuation of a lock switch 13 or the unlocking switch 14 is carried out, a switching circuit 15 is switched to operating state, and the output of a rechargeable battery 12 minds, it is given to a microcomputer 3, EEPROM4, and the sending-circuit section 5, and a microcomputer 3 is switched to an active state according to this. Moreover, at this time, the actuation signal accompanying ON actuation of the above-mentioned lock switch 13 or the unlocking switch 14 comes to be given to input port PI1 or PI2 of a microcomputer 3.

[0040] Thus, the microcomputer 3 made into the active state When the actuation signal from a lock switch 13 is inputted to input port PI2, while transmitting the lock signal containing the code code memorized by EEPROM4 through the sending-circuit section 5 When the actuation signal from the unlocking switch 14 is inputted to input port PI3, it comes to demonstrate the transmitter ability of transmitting the unlocking signal containing the above-mentioned code code through the sending-circuit section 5.

[0041] On the other hand, the system-wide configuration is shown to drawing 2 by the combination of functional block in ** type. In this drawing 2, antenna coil 23 is arranged in the surroundings of the ignition key cylinder 22 for automobiles, and where said ignition key 1 is inserted to that key cylinder 22, the antenna coil 23 concerned and said coil 7 (refer to drawing 1) for transponders built in the ignition key 1 have composition by which an electromagnetic coupling is carried out.

[0042] Said transmission and reception ECU 9 prepared in the automatic car side were constituted centering on the microcomputer 24, and the ON signal from the IG switch 25, the KIRI mind switch 26, the lock position switch 27, and the KATESHI switch 28 of the common knowledge configuration prepared corresponding to said ignition key cylinder 22 is inputted through the switch interface 29 to the microcomputer 24.

[0043] Moreover, while the input signal by antenna coil 23 is inputted through the receiving circuit 30 for immobilizer ability to the above-mentioned microcomputer 24, it has the composition that the input signal by the remote key antenna 31 is inputted through the receiving circuit 32 for a remote function.

[0044] The microcomputer 24 has the composition of performing control of the horn relay 36 for carrying out singing of the door-lock relay 34 for locking and unlocking the door-lock device which is not illustrated and the door unlocking relay 35, and the horn for automobiles that is not illustrated through the relay interface 37, and is later mentioned about the contents of concrete control while the output of power amplification 33 performs the transmission control which led antenna coil 23.

Moreover, the microcomputer 24 has composition which delivers and receives a signal through serial interface 39 between the engine control ECU 38 as a load for cars, and has the composition that the engine starting operation by the engine control ECU 38 can be forbidden alternatively, like the after-mentioned.

[0045] Furthermore, the microcomputer 24 has composition which delivers and receives data between EEPROMs40, and the respectively same identification code as the identification code and the code code (the identification code and the code code which are contained in a reply signal and a remote signal from the ignition key 1 side concerned, respectively) which were memorized by EEPROM4 by the side of the ignition key 1 prepared as the object for automobiles concerned, and a code code are beforehand memorized by this EEPROM40.

[0046] In addition, each manual operation buttons 13b and 14b of said lock switch 13 and the unlocking

switch 14 (refer to drawing 1) are arranged at key grip 1a of an ignition key 1.

[0047] Now, the contents of control of the microcomputer 24 which transmission and reception ECU 9 have below are explained with an operation of the related part. That is, only when a lock signal is received through the remote key antenna 31, and the lock position switch 27 has the code code contained in the lock signal in the condition of having detected unlocking of a door-lock device, in accordance with the code code in EEPROM40, a microcomputer 24 drives the door-lock relay 34, and switches the door-lock device concerned to a lock condition.

[0048] Only when an unlocking signal is received through the remote key antenna 31, and the lock position switch 27 has the code code contained in the unlocking signal in the condition of having detected the lock of a door-lock device, in accordance with the code code in EEPROM40, a microcomputer 24 drives the door unlocking relay 35, and switches the door-lock device concerned to an unlocking condition.

[0049] A microcomputer 24 emits an alarm by driving a horn relay 36 and carrying out singing of the horn, when carried out except the unlocking signal which unlocking of the door-lock device received through said remote key antenna 31 when the lock position switch 27 switched from the lock detection condition of a door-lock device to an unlocking detection condition.

[0050] Furthermore, when a microcomputer 24 receives the ON signal from the KIRI mind switch 26 and the IG switch 25, that is, when an ignition key 1 is inserted to the ignition key cylinder 22 and it is operated in ON location (the electromagnetic coupling of antenna coil 23 and the coil 7 for transponders by the side of an ignition key 1 is carried out in this condition) By operating power amplification 33, the question signal of the shape of a pulse train made to superimpose on the carrier signal of predetermined frequency and this from antenna coil 23 is transmitted.

[0051] Thereby, as a carrier signal and a question signal are transmitted through antenna coil 23 to the transmitter-receiver 2 (refer to drawing 1) by the side of an ignition key 1 and being mentioned above in the transmitter-receiver 2 concerned, CPU3 comes to be switched to an active state by the above-mentioned carrier signal, and it comes to demonstrate the transponder ability of answering a letter in the reply signal containing the identification code memorized by EEPROM4 according to this.

[0052] A microcomputer 24 suspends transmission of the carrier signal which led power amplification 33 and antenna coil 23 while forbidding starting of the car motor by the engine control ECU 38, when the identification code in the reply signal answered from the transmitter-receiver 2 side is not in agreement with the identification code memorized by EEPROM40.

[0053] Therefore, when the IG switch 25 is turned on by the un-proper ignition key 1 whose identification code does not correspond, since car motor does not start, the security to a theft comes to improve.

[0054] When the identification code in the received reply signal is in agreement with the identification code memorized by EEPROM40, while, permitting starting of the car motor by the engine control ECU 38 on the other hand, transmission of the carrier signal which led power amplification 33 and antenna coil 23 is continued.

[0055] Therefore, where the proper ignition key 1 whose identification code corresponds is inserted in the ignition key cylinder 22, starting of the car motor which led the engine control ECU 38 will be permitted, and it has the composition of demonstrating immobilizer ability as mentioned above. Moreover, after starting of car motor is permitted in this way, charge of the rechargeable battery 12 which led the charge circuit section 11 as antenna coil 23 was mentioned above in the transmitter-receiver 2 by the side of an ignition key 1, since transmission of the carrier signal which led was continued comes to be performed.

[0056] In short, according to the above-mentioned configuration of this example, effectiveness which is described below comes to be acquired. The configuration which built the whole transmitter-receiver 2 in key grip 1a of an ignition key 1 as one unit is realizable, and since a microcomputer 3 and EEPROM4 can be made into the passive circuit elements used also [ability / transponder ability and / both / transmitter], while the futility of passive circuit elements decreases and they are made to cost ** at least by this, the situation which the whole enlarges can be prevented beforehand. And since transponder

ability is controllable by the program of a microcomputer 3, it is lost that the communications protocol between a transmitter-receiver 2 and transmission and reception ECU 9 will be fixed like a configuration before. Consequently, the degree of freedom on a design becomes high. Moreover, when applying a different scramble for every manufacture manufacturer of an automobile, or destination to the reply signal containing identification code, since it becomes unnecessary to change a hardware configuration, fabrication operation nature comes to improve.

[0057] The 2nd example of this invention is shown in drawing 3, and only a part which is below different from said 1st example about this is explained. That is, this 2nd example has the description at the point which added the circuitry for preventing the overcharge over a rechargeable battery 12. That is, when the upper limit electrical potential difference from which the electrical-potential-difference detecting circuit section 41 which detects the terminal voltage of a rechargeable battery 12 was formed, and the detection electrical potential difference by this electrical-potential-difference detecting circuit section 41 was beforehand set to the transmitter-receiver 2 side in this example as shown in drawing 3 is exceeded While considering as the configuration which transmits a charge termination signal to a transmission-and-reception ECU 9 side, when the above-mentioned charge termination signal is received to a transmission-and-reception ECU 9 side, it is considering as the configuration which prepares the function to suspend continuation transmission of a carrier signal.

[0058] It sets to drawing 3, and while the above-mentioned electrical-potential-difference detecting circuit section 41 connects between the base emitters of reference diode 41a of an illustration polarity, resistance 41b, and npn form transistor 41c between the plus side edge child of a rechargeable battery 12, and a grand terminal, it has the composition of having connected the collector of the transistor 41c to the power supply terminal Vz through 41d of resistance, and, specifically, the above-mentioned collector is connected to input port IP5 of a microcomputer 3.

[0059] When the terminal voltage of a rechargeable battery 12 rises by this more than the upper limit electrical potential difference which is sufficient for carrying out breakdown of the reference diode 41a, transistor 41c is turned on and the input voltage to input port PI5 of a microcomputer 3 is reversed to a low level. A microcomputer 3 performs actuation which transmits said charge termination signal through the resonance circuit section 6 by operating the output interface section 19, when the input voltage to input port PI5 is reversed to a low level in this way.

[0060] In this case, when the function to suspend continuation transmission of a carrier signal is prepared in the transmission-and-reception ECU 9 side when the above-mentioned charge termination signal is received, therefore the terminal voltage of a rechargeable battery 12 rises more than an upper limit electrical potential difference, transmission of the carrier signal for charge to a rechargeable battery 12 is suspended automatically, and overcharge of the rechargeable battery 12 concerned comes to be prevented beforehand.

[0061] In addition, expansion or deformation which it is not limited to the above-mentioned example and described below is possible for this invention. Although the door-lock device for automobiles and the engine control ECU 38 which are not illustrated were raised to the example as a load for cars, you may be the load for cars of especially others [device / for automobiles / door-lock], such as a trunk lid opener.

[0062] In the 2nd example, it is good also as a configuration which performs transmission of a charge termination signal through the sending-circuit section 5. However, in advance of that send action, it is necessary to start the power source of the above-mentioned sending-circuit section 5 in this case by switching the switching circuit section 15 to operating state through the holding circuit section 16.

[0063]

[Effect of the Invention] By the above explanation, according to the load control system for cars using the transmitter-receiver by this invention, and its transmitter-receiver, so that clearly By adopting the configuration of control by the same microcomputer realizing transponder ability and transmitter ability Futility of passive circuit elements can be lessened, and thereby, while prevention of enlargement is realizable for the reduction list of cost, the useful effectiveness that improvement in the degree of freedom on a design and improvement in fabrication operation nature can be realized now is done so.

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[Field of the Invention] This invention relates to the transmitter-receiver equipped with the transmitter ability for transmitting the remote signal for operating a load by remote control, and the transponder ability of answering a letter in a reply signal when a power signal and a question signal are given, and the load control system for cars using this transmitter-receiver.

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PRIOR ART

[Description of the Prior Art] For example, in the automobile, in order to aim at improvement in the security engine performance to a theft, adding the function as an electronic key in which electric identification code was used, to an ignition key is performed. In this case, it has become general to the key grip of an ignition key to build in a transceiver unit, and the above-mentioned transceiver unit has composition equipped with the transponder ability of answering a letter in the reply signal containing the identification code memorized beforehand, when a power signal and a question signal are given from the exterior.

[0003] For the above-mentioned electronic key function, furthermore, to an automatic car side Where the ignition key constituted as mentioned above is inserted in the key hole for engine starting Transmit said power signal and a question signal, and said reply signal is received from the transceiver unit by the side of the ignition key concerned. Only when the identification code in the reply signal is in agreement with the identification code set up beforehand, it considers as the configuration which forms the transmission and reception ECU equipped with the immobilizer ability of permitting engine starting by the ignition key.

[0004] in order that this may operate a door-lock device by remote control in an automobile independently, the transmitter equipped with the transmitter that the keyless entry system system of a wireless method has spread widely, and transmits the remote signal which contains the identification code beforehand decided according to actuation of a switch in this system with an air propagation signal (for example, electric wave) is formed, and, on the other hand, this transmitter is built in the unit case which constitutes a key holder -- usually -- ** -- it has become.

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EFFECT OF THE INVENTION

[Effect of the Invention] By the above explanation, according to the load control system for cars using the transmitter-receiver by this invention, and its transmitter-receiver, so that clearly By adopting the configuration of control by the same microcomputer realizing transponder ability and transmitter ability Futility of passive circuit elements can be lessened, and thereby, while prevention of enlargement is realizable for the reduction list of cost, the useful effectiveness that improvement in the degree of freedom on a design and improvement in fabrication operation nature can be realized now is done so.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] Although the passive circuit elements which can be made to serve a double purpose were also under the situation many, with the transceiver unit equipped with transponder ability, and the transmitter equipped with transmitter ability, when both sides needed transponder ability and transmitter ability, while the futility of passive circuit elements increased and causing the jump of cost, with a configuration, there was a trouble of enlarging as a whole on the relation prepared after these transceiver unit and the transmitter have dissociated conventionally. [0006] Moreover, since it was common to consist of hard logic as for the transponder ability of a transceiver unit, the communications protocol during the transmission and reception ECU by the side of a car will be fixed from the beginning, and it had the trouble to say that the degree of freedom on a design became low as a result. And since the scramble processing technique was uniquely decided when applying a scramble to identification code in order to raise the security engine performance, when a different scramble for every manufacture manufacturer of an automobile or destination was applied, there was a trouble that the fabrication operation nature got worse -- there is the need of changing a hardware configuration.

[0007] This invention is made in view of the above-mentioned situation, and the purpose is in offering the control system of the load for cars using the transmitter-receiver which enabled it to solve each above trouble at once, and its transmitter-receiver by adopting the configuration of control by the same microcomputer realizing transponder ability and transmitter ability.

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MEANS

[Means for Solving the Problem] In order that the transmitter-receiver by this invention may solve the above technical problems, it is in the condition that the electromagnetic coupling of the transceiver section containing the resonance circuit section which consists of the coil for transponders and a resonant capacitor, and this transceiver section was carried out to external antenna coil. The power circuit section which rectifies the power signal given through the transceiver section concerned from the antenna coil, The microcomputer which operates with the output of this power circuit section, or the output of a built-in cell, The actuation switch which generates an actuation signal and is given to said microcomputer when external actuation is carried out, The output of said built-in cell is used for the remote signal for operating a load by remote control. The sending-circuit section which can transmit, The input interface section which discriminates from the question signal given with said power signal to said transceiver section, and is given to said microcomputer, After having the storage means which memorizes the identification code of a proper and changes, and the output interface section for transmitting the reply signal which answers said question signal and contains said identification code through said transceiver section When control which transmits said remote signal through said sending-circuit section when said actuation signal is received for said microcomputer is performed and said question signal is received While reading identification code from said storage means, it considers as the configuration which performs control which transmits the reply signal containing the identification code concerned through said output interface section and the transceiver section.

[0009] According to this configuration, at least, while being able to constitute the whole transmitter-receiver as one unit, since a microcomputer can be made into the passive circuit elements used also [ability / transponder ability and / both / transmitter], the futility of passive circuit elements decreases and it comes be made into cost **. And since transponder ability is controllable by the program of a microcomputer, while a communications protocol can be changed freely and the degree of freedom on a design becomes high by it, the scramble of the specification of the number of ** can be set up easily, without changing a hardware configuration, and it may come (claim 1) to raise fabrication operation nature.

[0010] In this case, it can consider now as the passive circuit elements which were good also as a configuration which performs control which transmits the remote signal containing the code code memorized by said storage means in said microcomputer when said actuation signal is received through said sending-circuit section, and used the above-mentioned storage means other than a microcomputer also [ability / transponder ability and / both / transmitter] in this case (claim 2).

[0011] Moreover, you may constitute possible [modification of said identification code] by using the nonvolatile memory in which data rewriting is possible for said storage means, and while according to this configuration being able to make now a setup and modification of identification code easily and raising the degree of freedom on a design further, that storage means can be used now to other useful data storages, and it becomes convenient on actual use (claim 3).

[0012] Furthermore, the switching circuit section which operates according to external actuation of said actuation switch being carried out, and gives the output of said built-in cell to said sending-circuit

section and microcomputer, After having the holding circuit section which holds this switching circuit section to operating state When the said microcomputer actuation-signal according to external actuation of said actuation switch is received, a period until transmission of the remote signal which led completes said sending-circuit section at least It is good also as a configuration which holds said switching circuit section to operating state through said holding circuit section.

[0013] When an actuation switch is operated according to this configuration, since the power source of the sending-circuit section for the microcomputer concerned and remote signal transmission comes to be held through the switching circuit section and the holding circuit section, the send action of a remote signal will be performed only by carrying out one-touch control of the actuation switch, and that operability of a period [until the send action of the remote signal by the microcomputer is completed] comes (claim 4) to improve.

[0014] Moreover, it can also consider as the configuration equipped with the charge circuit section which charges the above-mentioned rechargeable battery using the power signal to which said power circuit section is given through the transceiver section from said antenna coil after a rechargeable battery constitutes said built-in cell, and according to this configuration, since exchange of a built-in cell becomes unnecessary substantially, maintenance nature comes (claim 5) to improve.

[0015] In this case, after having the electrical-potential-difference detecting circuit section which detects the terminal voltage of said rechargeable battery, when the upper limit electrical potential difference to which the detection electrical potential difference by said electrical-potential-difference detecting circuit section was beforehand set in said microcomputer is exceeded, it can be alike, it can consider as the configuration which functions as stopping the charge actuation by said charge circuit section, and according to this configuration, the overcharge over a rechargeable battery can be beforehand prevented now (claim 6).

[0016] After considering as the configuration using the transmitter-receiver indicated by any of above-mentioned claims 1-5 they are, the control system of the load for cars by this invention The antenna coil by which an electromagnetic coupling is carried out to the coil for transponders which the transmitter-receiver concerned has where said transmitter-receiver is set to a convention location at a car side, Where the electromagnetic coupling of the above-mentioned coil for transponders is carried out to this antenna coil, while transmitting a power signal and a question signal through the antenna coil concerned to said transmitter-receiver Only when the identification code in the reply signal received through said antenna coil after this transmission is in agreement with the identification code set up beforehand, it considers as the configuration which establishes the control means to which the immobilizer ability which permits starting of the engine for cars was set (claim 7).

[0017] Moreover, it sets to the control system of the load for cars using said transmitter-receiver according to claim 6. The antenna coil by which an electromagnetic coupling is carried out to the coil for transponders which the transmitter-receiver concerned has where said transmitter-receiver is set to a convention location at a car side, Where the electromagnetic coupling of the above-mentioned coil for transponders is carried out to this antenna coil, while transmitting a power signal and a question signal through the antenna coil concerned to said transmitter-receiver Only when the identification code in the reply signal received through said antenna coil after this transmission is in agreement with the identification code set up beforehand, after establishing the control means to which the immobilizer ability which permits starting of the engine for cars was set In after starting authorization of said engine for cars, the rechargeable battery by the side of a transmitter-receiver can be charged by considering as the configuration which continues transmission of said power signal [as opposed to said transmitter-receiver for said control means] (claim 8).

[0018]

[Embodiment of the Invention] It explains referring to drawing 1 and drawing 2 hereafter about the 1st example which applied this invention to the load control system for automobiles. The electric configuration of the transmitter-receiver 2 built in where unitization is carried out to drawing 1 to the key grip of the ignition key (a sign 1 is attached and shown in drawing 2) equipped with the function as a remote key is shown.

[0019] The transponder ability for answering a letter in the reply signal containing the identification code which was constituted centering on the microcomputer 3, answered the question signal when a power signal and a question signal were received from the transmitter ability for transmitting the remote signal containing the code code set up beforehand and the exterior, and was set up beforehand is set up, and the above-mentioned transmitter-receiver 2 explains the concrete configuration below.

[0020] That is, said code code and identification code of a proper are memorized by the ignition key 1 at EEPROM4 (equivalent to the storage means and nonvolatile memory as used in the field of this invention) accessed with a microcomputer 3. In addition, the above-mentioned code code and identification code may be the same codes. Moreover, the power source of EEPROM4 is given from a power supply terminal Vz.

[0021] The sending-circuit section 5 prepared so that electric power might be supplied from a power supply terminal Vz It is for transmitting the remote signal (a lock signal and unlocking signal) for being controlled by the microcomputer 3 and ordering it the lock and unlocking of the door-lock device for automobiles as a load for cars (not shown). It is constituted as an oscillator circuit which connected Coila [5] and 5b, Capacitorc [5]-5f, and variable-capacity capacitor 5g, Resistance 5h-5j, transistor 5k, and 5m of SAW components like illustration. In addition, carrier frequency is set as a VHF band or a UHF band, and this sending-circuit section 5 is considered as the configuration which transmits the remote signal of the shape of a pulse train containing said code code by amplitude modulation.

[0022] The resonance circuit section 6 carries out parallel connection of the coil 7 for transponders, and the resonant capacitor 8 between signal-line SL and a grand terminal, and is constituted between, and the resonance frequency is set up so that it may become equal to the frequency band of the carrier signal (equivalent to the power signal as used in the field of this invention) transmitted from the transmission and reception ECU as a control means established at the automatic car side (a sign 9 is attached and shown in drawing 2).

[0023] The power circuit section 10 connected to the above-mentioned signal-line SL is for giving the output which carried out rectification smooth [of the carrier signal which the resonance circuit section 6 received] to said power supply terminal Vz and the power supply terminal VDD of a microcomputer 3, and has the composition of having connected diode 10for rectification a, reference diode 10b, diode 10c [for reverse inhibition], and capacitor 10d for smooth, and resistance 10e like illustration.

[0024] The charge circuit section 11 was formed in order to charge the rechargeable battery 12 built in the transmitter-receiver 2, and it has the composition of having connected diode 11a and current-limiting-resistor 11b of an illustration polarity to the serial between the cathode of diode 10a for rectification in said power circuit section 10, and the plus side edge child of a rechargeable battery 12. In addition, the minus side edge child of a rechargeable battery 12 is connected to the grand terminal.

[0025] A lock switch 13 and the unlocking switch 14 (all are equivalent to the actuation switch as used in the field of this invention) are operated, respectively, when outputting the lock signal and unlocking signal which are a remote signal from said sending-circuit section 5, and these are constituted by the momentary switch of a normally open form.

[0026] In this case, if it is in a lock switch 13 and the unlocking switch 14, while common connection of one one end each is made, that common node is connected to the plus side edge child of a rechargeable battery 12 through the resistance 15a and 15b in the switching circuit section 15 mentioned later. Moreover, each other end side of a lock switch 13 and the unlocking switch 14 is connected to the grand terminal through the pull down resistors 13a and 14a corresponding to each while connecting with the input port PI1 and PI2 of a microcomputer 3, respectively.

[0027] By this, an actuation signal will be inputted into the input port PI1 and PI2 of a microcomputer 3 whenever a lock switch 13 and the unlocking switch 14 are operated.

[0028] The above-mentioned switching circuit section 15 is for giving the output of a rechargeable battery 12 to a microcomputer 3, EEPROM4, and the sending-circuit section 5 through said power supply terminal Vz, and has the composition of having connected between the emitter collectors of pnp form transistor 15c between the plus side edge child of a rechargeable battery 12, and the cathode of diode 10c in said power circuit section 10. In addition, in the switching circuit section 15, said resistance

15a is connected between the common nodes of the base of transistor 15c, said lock switch 13, and the unlocking switch 14, and said resistance 15b is connected between the base emitters of transistor 15c.
[0029]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] The electric block diagram of a transmitter-receiver showing the 1st example of this invention

[Drawing 2] The functional block diagram showing a system-wide configuration

[Drawing 3] The drawing 1 equivalent Fig. showing the 2nd example of this invention

[Description of Notations]

One among a drawing a transmitter-receiver and 3 for an ignition key and 2 A microcomputer, EEPROM (a storage means, nonvolatile memory) and 5 4 The sending-circuit section, 6 the coil for transponders, and 8 for the resonance circuit section and 7 A resonant capacitor, 9 the power circuit section and 11 for transmission and reception ECU (control means) and 10 The charge circuit section, A rechargeable battery (built-in cell) and 13 12 A lock switch (actuation switch), An unlocking switch (actuation switch) and 15 14 The switching circuit section, 16 -- the holding circuit section and 17 -- the transceiver section and 18 -- in the input interface section and 19, antenna coil and 38 show the engine control ECU (load for cars), and, as for the output interface section and 22, 41 shows the electrical-potential-difference detecting circuit section, as for an ignition key cylinder and 23.

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